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NOTES AND LITERATURE

Genetics in Relation to Agriculture. By E. B. BABCOCK and R. E. CLAUSEN. New York: McGraw-Hill, 1918. Pp. ix–xx + 675, Fig. 239, Pl. 4.

Every geneticist who opens this volume in a spirit of hope and expectation will close it with appreciation and satisfaction, with a feeling that a tremendous task has been worthily accomplished. Unquestionably it will fill a real need as a text-book. In addition it should be of great service to the general biologist —using that term in its broadest sense—who wishes to have a compendium of genetical facts for ready reference.

The work is divided into three parts; it is really three volumes in one. In the first part the fundamental principles of genetics are outlined, in the second plant breeding is discussed, in the third animal breeding is considered.

There are thirty-nine chapters and an excellent glossary. The bibliography of twenty-four pages is not complete and does not purport to be complete. It is a list of the actual titles consulted in the preparation of the manuscript, truly no light undertaking.

The reputation of both authors as careful investigators is so firmly established that one is not surprised to find the immense volume of genetic literature of the past eighteeen years judiciously weighed and sifted, but that they found the time during the selection of material for so much constructive and illuminating criticism is perhaps not to have been anticipated. Moreover, since an investigator is not necessarily a good text-book writer, one suspects that the general excellence of the book from the pedagogical standpoint is due largely to Dr. Babcock's special training and long experience as a teacher.

After an introductory chapter on the methods and scope of genetics, the authors have chosen to open the volume by treating variation. Several modifications of older classifications of variation are given which may or may not prove useful. They were probably included rather tentatively as introductory to the main business of the chapter, the action of external stimuli in modifying development and causing germinal variation. Some of the illustrations here are not all that might be desired, for example, the work of T. H. White on making new varieties of tomatoes by adding large quantities of fertilizers, which is rather hesitatingly cited. But perhaps one should criticize matter which does not appear rather than matter which does appear. In other words, if the reviewer may express his own hope in the connection, it is to see a more extended, well-rounded discussion of the action of the factors of environment in a later addition.

The statistical study of variation has been given a very pleasing treatment. The mathematician will undoubtedly complain that it is amateurish because it is given with a minimum of technical language. But just there lies its value in such a text-book. The necessary statistical tools are described so clearly that the elementary student can hardly err in their use. The more advanced student is properly directed elsewhere.

The physical basis of heredity is also discussed with great independence. The chromosome hypothesis is accepted without reservation. Cytological details not bearing directly on the subject in hand are not even mentioned, while those described—though accurate as far as they go—are somewhat diagrammatic. It will be interesting to see how this treatment works out in the classroom. No doubt many will find it a welcome change from the interminable details of unknown significance that often fill the pages of books on genetics. At the same time it is perhaps to be regretted that the difference between the higher plants and the higher animals in gametogenesis, and the bearing on genetics of the conflict between supporters of parasynapsis and telesynapsis, are not given more space.

A hundred and fifty pages are devoted to Mendelian interpretations of breeding facts. A wealth of illustration is used, and almost all types of Mendelian ratios are represented, although it is not easy to gather them together in a general *ensemble*. The older treatments of Plate and of Goldschmidt, where every theoretical modification of the Mendelian ratio was mentioned and then a case in point cited, had their value from a pedagogical standpoint, and it is rather to be deplored that their use was not continued. The newer data, in particular the work of Morgan and his students, is admirably presented, however. For the first time text-book treatment of crossing over, interference, and the various other phenomena discovered in *Drosophila*, is given in such a manner that the beginning student should be able to grasp the essential points without difficulty.

Interesting chapters on species hybridization, pure lines and mutations comprise the remainder of part one. The discussion of mutations will probably not please DeVries, but it certainly is more in accord with all the facts than most other essays on the subject.

The applied genetics, animal breeding and plant breeding, filling twenty-four chapters, ought to be received with great approbation. Its compilation must have been very difficult, and its usefulness should be in direct proportion to the work involved. There is a great deal of new material of a strictly practical nature such as the origin of sweet pea varieties, breeding disease-resistant plants, etc. On the other hand, there is really no definite line to be drawn between part one and parts two and three. Theoretical genetics runs all through the book. For example one finds the treatment of heterosis, graft-hybrid chimeras and bud mutations in part two; and in part three discussions of Mendelian inheritance in domestic animals, acquired characters, non-Mendelian theories of sex-determination, the hormone theory, etc. The work is so well done that it must be read to be appreciated. The reviewer has but one suggestion to make concerning it, and this not in the nature of a criticism. Partially sterile hybrids between species, as is shown in Chapter 12, supply particularly useful material for the improvement of domestic animals and cultivated plants. If one studies carefully the history of domestic species, fragmentary as it is, he is astounded at the enormous number of cases in which the ancestry involves two or more species. Would it not be well to emphasize this point by extended illustrations in a book on plant and animal breeding?

The authors are to be congratulated on having brought together the material for a classical text-book on genetics. Revision will doubtless soon be necessary as is suggested in the preface. If it is made with the care that such an excellent foundation deserves the work will unquestionably go through many editions.

The McGraw-Hill Company deserve no little credit for the generous way in which they have seconded the authors' efforts. The typography, illustrations, paper and binding are extremely good. We understand that this is their first contribution toward a series of agricultural text-books under the general editorship of C. V. Piper. A standard has been set that is a good augury for the future.

E. M. E.